**Before the**
**FEDERAL COMMUNICATIONS COMMISSION**
**Washington, DC 20554**

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| **In the Matter of:** | **)** | |
| | **)** | |
| **Review of the Commission's Rules** | **)** | **WT Docket No. 17-200** |
| **Governing the 896-901/935-940 MHz Band** | **)** | |

# REPLY COMMENTS OF THE AD HOC REFINERS GROUP

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## EXECUTIVE SUMMARY

The proposal to establish a 3 x 3 MHz broadband segment in the 900 MHz band will adversely impact the very large 900 MHz narrowband systems operated by the Refiners, particularly at existing refinery, petrochemical and NGL fractionator facilities, as well as the ongoing and future expansion of these facilities. A substantial portion of these facilities are concentrated in the Houston area, along the Texas Gulf Coast, in southern Louisiana, and in southern California ("Core Areas").

These narrowband systems are the principal wireless systems deployed at these complexes to support day-to-day operations and emergency response activities and are designed and managed to remain operational during the hurricanes, tornadoes and other adverse weather events. Though potentially of interest to other segments of the oil and gas industry, the 3 x 3 MHz or 1.4 x 1.4 MHz systems will not supply the bandwidth and low latency needed to meet wireless data requirements of the "Refinery of the Future."

The persistent disagreement reflected in Comments filed in response to the NPRM and in filings previously submitted in this proceeding is less about the merits of a 3 x 3 MHz or 1.4 x 1.4 MHz broadband segment in the 900 MHz band, but more about the notion that a 3 x 3 MHz broadband license should take precedence over 900 MHz narrowband systems in every area of the country. This "one size fits all approach" poses significant near-term and long-term risks to the Refiners. The near-term risk pertains to disruption to existing 900 MHz narrowband operations due to interference attributable to their close spectral proximity to the proposed 900 MHz 3 x 3 MHz LTE broadband operations, as well as the compaction of narrowband frequencies available at 900 MHz. The long-term risk is the loss of 900 MHz narrowband licenses to support the existing and planned billion-dollar investments in new physical plant and capacity enhancements in areas in which energy industry facilities are concentrated.

As several parties observe, there are areas of the country in which a 3 x 3 MHz broadband allocation may not be appropriate because of the presence of large or complex 900 MHz narrowband systems. In many of these areas, a 1.4 x 1.4 MHz LTE-compliant band could be authorized, providing a critical guard band between the narrowband and broadband segments and allow expansion of these critical 900 MHz narrowband systems. This flexible approach is particularly important for the Refiners. In their Core Areas, expansion of 900 MHz narrowband systems are the only option; additional 800 MHz spectrum that is projected to become available will likely be assigned to existing 800 MHz systems deployed at Refiners' other facilities and the facilities of other petroleum and natural gas companies and other large B/ILT licensees located in the Core Areas.

This flexible approach will provide the important incidental benefit of reducing the time and cost involved in negotiating and implementing 900 MHz narrowband frequency relocations. Fewer 900 MHz frequencies will be affected and the financial strain of relocation costs on the largest 900 MHz SMR-area wide licensee will be minimized.

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## REPLY COMMENTS OF THE AD HOC REFINERS GROUP

The Ad Hoc Refiners Group, comprised of Exxon Mobil Corporation and Phillips 66 Company (alternatively referred to as "Ad Hoc Refiners Group" or "the Refiners"),[1] submits these Reply Comments in response to the Notice of Proposed Rulemaking ("NPRM") released by the Federal Communications Commission ("Commission" or "FCC").[2] The Refiners have a continuing interest in this proceeding, previously submitting Reply Comments in response to the underlying Petition for Rulemaking,[3] Comments in Response to the 2015 Supplemental Public Notice,[4] and Comments in response to the Notice of Inquiry (NOI)[5] and through ex parte discussions with Commission staff.[6]

[1] B/ILT 900 MHz site-based authorizations are licensed to Exxon Communications Company under Section 90.33(a) of the Commission's rules to support the operations of business units or affiliates of Exxon Mobil Corporation (hereinafter referred to as "ExxonMobil") and to Phillips 66 Communications Inc. under Section 90.33(a) of the Commission's rules to support the operation of business units or affiliates of Phillips 66 Company (hereinafter "Phillips 66").

[2] *Review of the Commission's Rules Governing the 896-901/935-940 MHz Band, Notice of Proposed Rulemaking*, WT Docket No. 17-200, FCC 19-18 (rel Mar. 14, 2019) (*"NRPM"*).

[3] Reply Comments of Ad Hoc Refiners Group, RM-11738, filed January 27, 2015.

[4] Reply Comments of Ad Hoc Refiners' Group, RM-11738, filed June 29, 2015.

[5] Comments of Ad Hoc Refiners Group, WT Docket 17-200, filed October 17, 2017 ("NOI Comments").

[6] Notice of Ex Parte Letter, WT Docket No. 17-200, filed November 6, 2018 ("Refiners' Ex Parte Letter").

## BACKGROUND

The Refiners operate very large 900 MHz (and 800 MHz) narrowband radio systems enabling wireless voice communications in support of operations at their major petroleum refineries, petrochemical plants, and natural gas liquids (NGL) fractionators. These narrowband systems provide essential wireless communications to several thousand employees and contractors that comprise the workforces at the Refiners' multibillion-dollar complexes.

The Comments filed by parties in response to the NPRM, as those submitted during earlier phases in the Commission's recent review of the 900 MHz band, reflect a substantial, persistent division on the merits of the proposed 3 x 3 MHz assignment in the 900 MHz LMR band.[7] The disagreement is less about the merits of either authorizing 3 x 3 MHz or 1.4 x 1.4 MHz LTE-compliant licenses in the 900 MHz band, but the notion that a 3 x 3 MHz broadband license should take precedence over 900 MHz narrowband systems in every area of the country. This "one size fits all approach" poses significant near-term and long-term risks to the Refiners. The near-term risk pertains to disruption to existing 900 MHz narrowband operations due to interference from their close spectral proximity to the proposed 900 MHz 3 x 3 MHz LTE broadband operations and compaction of narrowband frequencies available at 900 MHz. The long-term risk is the loss of 900 MHz narrowband licenses to support the planned billion-dollar investments in new physical plant and capacity enhancements in existing facilities in areas in which energy industry facilities are concentrated.

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[7] Comments of Critical Infrastructure Coalition, pp. 4-6. (This coalition includes several major electric delivery and generation companies and a municipal water and power district): See also, Comments of Utility Technologies Council, (UTC) pp. 9-13; Comments of NextEra Energy, Inc. ("NextEra") pp. 3-7 (outlining the extent of opposition to proposals substantially diminishing the availability of 900 MHz narrowband spectrum).

## DISCUSSION

### A. The Refiners and other Petroleum and Natural Gas Companies Have a Strong Interest in Large 900 MHz Systems in Critical Industry Areas

#### 1. 900 MHz Narrowband Systems Are Essential to Refiners' Operations

In the Houston and Texas Gulf Coast (Houston), southern Louisiana, and southern California areas, ("Core Areas"), the Refiners rely upon very large 900 MHz narrowband systems having up to several thousand portable and mobile units at their respective facilities,[8] as well as comparably-sized 800 MHz land mobile radio systems at other major facilities located in the same areas, to support day-to-day operations, new facility construction and major facility expansions, and emergency response communications. As the Refiners have explained in the earlier submissions in this proceeding, operators of refinery, petrochemical and NGL fractionator complexes have extensive risk management, public safety, and emergency response obligations under the state and federal environment and occupational safety and health laws and regulations.[9] In light of these statutory and public welfare responsibilities and the geographic location of their operations, the Refiners' 900 MHz narrowband systems have been engineered and managed to maximize survivability and rapid restoration during major weather events—hurricanes, floods and tornadoes.[10]

[8] For example, the number of mobile/portable units authorized under the Companies' 900 MHz band licenses at the Companies' refineries in the Houston, Texas area underscore extensive use of these internal mobile networks: Exxon Mobil WNIZ 658 (6500 units/36 channel pairs) and Phillips 66 WPDK 390 (2700 units/27 channel pairs).

[9] NOI Comments, pp. 3-4.

[10] Refiners Ex Parte Letter, p.2 (The Refiners' "900 MHz Band LMR systems are designed and built for capacity and coverage throughout the refineries and to accommodate peak demand/usage during adverse weather conditions (Hurricane Harvey) and other potential emergencies for which the companies must develop comprehensive response plans. During Hurricane Harvey's assault on the Houston and Texas Gulf coast areas in 2017, these private 900 MHz systems proved more reliable and resilient than wireline service and wireless services at the members' refineries).

The challenge for the Refiners is that 900 MHz narrowband spectrum is the principal, if not only, narrowband option for supporting wireless voice communications requirements at many of the Refiners' expansive complexes located in these Core Areas. These are the areas in which the country's refining, petrochemical, and NGL facilities are concentrated.[11] With the possible exception of Southern Louisiana, expansion of existing systems and construction and operation of new 900 MHz systems in these Core Areas would be substantially constrained, if not foreclosed, if a 3 x 3 MHz broadband license is mandated nationwide. The Refiners and operators of similar complexes in these Core Areas lack alternative spectrum resources.

This undesirable and unfortunate state of affairs is underscored by the recent Report and Order authorizing 800 MHz 12.5 kHz interstitial channels, in which the Commission observes "that there are no 800 Mid-Band channels available for application in the Interleaved Band, other than channels vacated by Sprint Corporation (Sprint), in New York City, Chicago, Los Angeles, or Houston" [12] [and that] "[t]he 800 MHz spectrum is essential to the future expansion of private land mobile systems."[13] It is probable, if not inevitable, as these frequencies become available for assignment in these metropolitan areas, the pent-up demand for additional 800 MHz private land mobile spectrum among current licensees of large 800 MHz trunked systems, including the expansion plans of the Refiners' other facilities and the refineries, fractionators, and

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[11] Susan Grissom, "U.S. refining hits record capacity", June 25, 2019, available at: https://www.afpm.org/newsroom/blog/us-refining-hits-record-capacity (last visited Jul. 2, 2019) (stating: "More than half of the 2019 increase [in record U.S. refining capacity] was in capacity along the U.S. Gulf Coast, which is home to more than 50 percent of total U.S. refining capacity, with the balance split between the Midwest and the West Coast.") ("Record Capacity News Report").

[12] *Creation of Interstitial 12.5 Kilohertz Channels in the 800 MHz Band Between 809-817/854-862 MHz*, WT Docket No. 15-32, WP Docket No. 16-21, Report and Order and Order, FCC 18-143, (rel. October 22, 2018) para. 25.

[13] *Id.* at para. 26.

petrochemical plants of the balance of the industry located in the Core Areas, will absorb this incremental increase in 800 MHz private land mobile spectrum. It also appears that the 800 MHz guard band frequency assignments may be assigned for narrowband, non-voice applications in many areas of the country,[14] further limiting availability of B/ILT 800 MHz I frequencies in these areas. For the Refiners' facilities in its Core Areas that rely on large 900 MHz narrowband systems, the 900 MHz narrowband frequencies will remain the singular option to meet future requirements for highly reliable, internal wireless requirements.[15] To this end, the Refiners support limiting eligibility to narrowband 900 MHz frequencies to B/ILT entities on a going-forward basis.[16] Moreover, many existing 900 MHz narrowband systems do not have dual 800/900 MHz capabilities.

**2. Growth in Refining, Petrochemical and NGL Facilities**

The expansion of capacity at existing facilities and the construction of new petrochemical facilities and NGL fractionators, particularly in the Houston, Gulf Coast and Southern Louisiana areas stem from the recent, unprecedented production of natural gas and crude oil in the Permian Basin and other areas in the United States. Earlier this year, ExxonMobil announced plans to invest $20 billion in the Gulf Coast region over 10 years to build and expand 11 manufacturing

[14] In its Comments, the Enterprise Wireless Alliance (EWA) noted that it appears the 800 MHz Guardband frequencies will not be available for large land mobile systems due to the anticipated grant of applications seeking authority to deploy narrowband Internet of Things (IoT) systems on these Guardband frequencies. Comments of EWA, at p. 6.

[15] As noted by another party, narrowband 900 MHz assignments are not currently available in some portions of the Los Angeles metropolitan area. Comments of The City of Los Angeles Department of Water and Power of the (LADWP), at p. 9.

[16] *See e.g.*, Comments of Utilities Technology Council, at p. 12 (stating: "Limiting eligibility exclusively to B/ILT licensees will further help to ensure they have access to narrowband spectrum for current and future needs").

facilities, resulting in tens of thousands of high-paying jobs.[17] Phillips 66 recently announced a $1.5 billion expansion of its Sweeny Hub, located just south of Houston, to construct two NGL fractionators and the associated pipeline infrastructure.[18] The ExxonMobil projects at Beaumont, TX, Baytown, TX, Baton Rouge, LA, San Patricio County, TX, and Sabine Pass, TX highlight the industry-wide trend of production capacity expansion and new investment in Core Areas.[19]

### 3. Refiners' Broadband Connectivity Requirements Exceed the Potential Throughput/Capacity of 3 x 3 MHz Broadband Systems

As other capital-intensive industries in which physical inputs are manufactured, processed, or formed to produce valuable intermediate or finished products, there are substantial opportunities in the petroleum, NGL, and petrochemical industries to enhance productivity,

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[17] *Multi-Billion Gulf Investment to Create Tens of Thousands of High-Paying Jobs*, ExxonMobil (Feb. 5, 2019), available at: https://corporate.exxonmobil.com/Energy-and-environment/Where-we-work/Growing-the-Gulf/20-billion-Gulf-investment-to-create-tens-of-thousands-of-high-paying-jobs#beaumont (last visited Jul. 2, 2019) ("ExxonMobil Online Projects Summary").

[18] *Phillips 66 to Expand Sweeny Hub with 300,000 BPD of New Fractionation Capacity*, BUSINESSWIRE (June 13, 2018), available at: https://www.businesswire.com/news/home/20180613005576/en/Phillips-66-Expand-Sweeny-Hub-300000-BPD (last visited Jul. 2, 2019).

[19] *See generally* ExxonMobil Online Projects Summary, which provides the following information:

- Among other facility construction plans, a new crude-processing unit to increase refining capacity by more than 65% at its Beaumont facility, expansion of an existing unit and additional facilities will be constructed
- At the Baytown complex—which currently employs a workforce of approximately 7,000 and spans 3400 acres along the Houston Ship Channel—the investment will support investment in new petrochemical production capacity
- The Baton Rouge complex—which currently has a 5,500-person workforce—will benefit from new investments leading to production capacity increases in petrochemicals and lubricants, among other projects.
- The company will be a partner in a proposed multi-billion-dollar plastics manufacturing facility in San Patricio County, Texas on the Texas Gulf Coast that is projected to create thousands of direct and indirect permanent job and construction jobs and allow for significant increases in production
- The project in Sabine Pass, Texas, in which the Company will partner with Qatar Petroleum, is an approximate $10 billion investment to increase the liquification and export capabilities of the existing liquefied natural gas terminal infrastructure on the Gulf Coast, generating peak construction employment of 3,000 individuals over five years.

extend asset life, minimize energy consumption, and implement process improvements through greater reliance on advanced analytics and real-time and near-real time data processing. The acquisition of data from sensors distributed throughout a production facility permits real-time adjustments to processes and more in-depth analysis of all aspects of the production process. As the Refiners recently explained to Commission staff, 3 x 3 MHz LTE-compliant systems will not meet these requirements.

> [A] 3 x 3 MHz band will not supply the bandwidth needed to support the "Refinery of the Future" that entails digitizing refinery operations enabling both real-time and interactive machine-to-machine communications and generating and transmitting massive amounts of data to support in-depth analytics. Member companies have researched existing and planned wireless technologies, concluding that bandwidths above existing 4G LTE networks will be necessary to support "Refinery of the Future" requirements.[20]

These requirements likely will best be supported by 5G-based wireless systems incorporated in industry-specific applications. Data and voice requirements of other segments of the petroleum and natural gas industries may benefit from 3 x 3 MHz or 1.4 x 1.4 LTE-compliant channelization schemes to support other uses, such as well-head and pipeline monitoring and control applications.[21] Thus, a flexible approach to managing the 900 MHz band has substantial merit.

### B. A Flexible Approach in Establishing a Broadband Authorization is in the Public Interest

#### 1. Compaction of 900 MHz Narrowband Assignments and Out of Band Energy ("OOBE") from Broadband Operations Adversely Impacts Narrowband Operations

Two intractable technical problems arise from the introduction of broadband operations in the 900 MHz band. One relates to the compaction of the available narrowband frequencies from

[20] Refiners Ex Parte Letter, p. 2.

[21] *See e.g.*, Comments of the American Petroleum Institute and ENTELEC, at p. 4.

the current 5 x 5 MHz narrowband configuration and the other relates to the spectral proximity of the proposed broadband segment to the proposed narrowband segments at 900 MHz. The proposed narrowband segments include a 1.5 x 1.5 MHz allocation at the low end and a 0.5 x 0.5 MHz at the high end of the 900 MHz band. The first issue is that compaction of the 900 MHz narrowband frequencies from 5 x 5 MHz to the two narrowband segments will impose sub-optimal, tighter channel spacing in base station combiners, adversely impacting transmitter output power and potential intra-system interference.[22]

The second stems from close spectral proximity of the proposed 900 MHz narrowband and broadband segments. The out of band energy ("OOBE") from broadband operations will likely result in harmful interference to at least some narrowband frequency assignments. Several parties observe that the Commission established a guard band at 800 MHz and at 700 MHz separating the Public Safety broadband and narrowband 700 MHz assignments and recommend that the same be established in the 900 MHz band.[23] The Refiners support this position. Recognized sources of interference to narrowband 900 MHz systems should be mitigated. Moreover, the OOBE problem is exacerbated by inserting the 3 x 3 MHz broadband segment between the two narrowband segments; more narrowband frequencies are closer to the broadband spectrum as compared to the original 3 x 3 MHz and 2 x 2 MHz segments.

The proposal to place a guard band between the 901-902 MHz Narrowband PCS band and upper 900 MHz narrowband segment (0.5 x 0.5 MHz) would effectively eliminate these

[22] *See* Comments of NextEra, GP&A Report, at p. 13; *See also* Comments of UTC, at p. 13, n. 15 (stating: "Generally, combiners require a minimum frequency separation of 100 kHz between transmit and receive channels, which may be difficult to achieve if only 1.5 MHz is available in the narrowband segment of the 900 MHz band.").

[23] *See e.g.*, Comments of NextEra, Harris Report, pp. 19-23; Comments of UTC, pp.7-8; and Comments of Lower Colorado River Authority (LCRA), pp. 4-6.

narrowband channels at the upper end of the 900 MHz band. This guardband appears unwarranted given that narrowband operations are presently being conducted on frequencies in this portion of the 900 MHz band with no reported systemic incidents of intersystem interference.

### 2. 1.4 x 1.4 MHz Broadband Authorizations Are Appropriate in a Number of Circumstances

For the reasons discussed above, expansion of large 900 MHz narrowband systems in certain areas of the country will likely be foreclosed absent a more flexible approach in establishing a broadband segment in the 900 MHz band. A path forward for maximizing the potential the 900 MHz band is provided by UTC, "there are areas of the country where it may not be appropriate to deploy a 3/3 MHz broadband system due to the presence of large and complex systems."[24] Another current narrowband 900 MHz licensee expresses a comparable sentiment, "[t]he Commission should let the marketplace decide whether there is need for broadband services use in the 900 MHz band in each market and if the realignment is in the public interest."[25] UTC offers a number of reasons why a 1.4 x 1.4 MHz system may be warranted.[26] As a general rule, a 1.4 x 1.4 MHz LTE-compliant segment likely could be implemented in many areas without impacting the long-term viability of substantial narrowband 900 MHz systems, as noted by several parties including the City of Los Angeles Department of Water and Power, [27]

[24] Comments of UTC, at p. 6.

[25] Comments of LCRA, at p 17.

[26] *See* Comments of UTC, at p. 14 (citing multiple reasons for a 1.4 x 1.4 MHz broadband segment).

[27] *See* Comments of the City of Los Angeles Department of Water and Power, at pp. 7-8

providing spectrum for incremental growth in existing 900 MHz systems and in supporting new narrowband systems.

Two factors should be relied upon to determine whether an area should be limited to a 1.4 x 1.4 MHz LTE authorization. That is, if an area meets one of two qualifications, the area should be designated as a 1.4 x 1.4 MHz broadband area. The first set consists of areas with a high number of assigned 900 MHz frequencies in very large systems in which 900 MHz frequencies are currently assigned to a combination of very large and more modest sized systems. [28] These would include the Refiners' facilities at which their large 900 MHz systems are deployed. The second criterion is system complexity—based on the number of base stations and a threshold number of assigned frequencies as proposed by several parties. In some instances, it may be necessary that narrowband systems located in these areas be exempt from 900 MHz relocation obligations as proposed by several parties.

This flexible approach is balanced and grounded in reality. In many areas of the country, including so-called "NFL cities," there are very modest or virtually no critical industry infrastructure 900 MHz systems. While several years old, data submitted by PDV and EWA in 2015 depict the distribution of 900 MHz licenses held by PDV and other 900 MHz licensees in major metropolitan areas in a series of charts. The data indicates that only a handful of CII licensees hold authorizations in Pittsburgh, Minneapolis, and Baltimore. The case is probably the same in Nashville and Detroit, among others. Conversely, the charts for Los Angeles and Riverside, CA and Houston, Texas reveal a substantial number of CII entities holding 900 MHz authorizations.

[28] *See* Comments of NextEra, at pp. 21-22.

### C. The Flexible Approach Will Reduce the Contentiousness over Relocation Negotiations

Few aspects of the NPRM raise more disagreement than the nature of relocation negotiations between the prospective 900 MHz broadband licensee(s) and narrowband licensees: should the relocation negotiations be voluntary or mandatory?[29] As noted in the preceding paragraph, there are many areas in which the relocation negotiations should not be a challenge due to the modest deployment of 900 MHz systems in those areas. The NPRM conveys mixed signals on the best approach for relocation discussions, particularly whether negotiations should be voluntary or mandatory.[30] As the Critical Infrastructure Coalition noted "[t]he notions of 'voluntary' and 'mandatory' cannot be reconciled."[31]

The Refiners maintain that voluntary relocation negotiations are in the public interest and believe the understandable concerns over mandatory negotiations would be mitigated and relocations expedited if the Commission limits the 900 MHz broadband allocation to 1.4 x 1.4 MHz in areas identified above. The potential adverse outcomes for 900 MHz narrowband licensees would be minimized. Intensely developed narrowband systems in many areas, though not perhaps all areas, would have access to 900 MHz narrowband frequencies for future expansion and, possibly, new systems. Also, it is possible that in some major markets the largest site-based 900 MHz narrowband licensee may be strongly inclined to enter into negotiations with the holder of the 900 MHz SMR area-wide licenses to secure the assignment or lease of a 3 x 3

[29] *See e.g*., Comments of United Parcel Service, pp. 12-14; Comments of Oncor Electric Energy Delivery, LLC (ONCOR) pp. 5-7; and Comments of Motorola Solutions, Inc. (Motorola), at p. 4 (supporting a "market-driven approach where 900 MHz site-based incumbents have the opportunity to relocate on a 100% voluntary basis and are not mandated to relocate").

[30] *See* Comments of NextEra, pp. 14-15.

[31] Comments of Critical Infrastructure Coalition (CIC), at p. 6.

MHz or a 1.4 x 1.4 MHz authorization. This range of potential outcomes also argues against a strict one-for-one frequency exchange requirement being attached to relocation negotiations.

Voluntary negotiations are consistent with the manner in which PDV (that now refers to itself as "Anterix") acquired the 900 MHz SMR area-wide licenses and, possibly, a number of site-based 900 licenses. It negotiated an arms-length spectrum assignment agreement with Sprint. Subsequently, it has negotiated agreements with 900 MHz site-based licensees, including a frequency-exchange agreement with one of the Refiners. The Refiners have negotiated with Sprint and another 900 MHz licensee to acquire 900 MHz narrowband licensees in the Houston, the Texas Gulf Coast, and in the Los Angeles areas.

The flexible approach to establishing a broadband allocation should also reduce aggregate spectrum relocation costs. This is potentially important for all parties including the current license holder of most of the SMR area-wide licenses. At least as of May 21, 2019, the CEO of Anterix, Morgan O'Brien, informed investors the company "needs an additional $100 million to $150 million to carry out its realignment plan and offer broadband services."[32] A reduction in upfront relocation costs should deliver the added benefit of potentially lowering spectrum leasing costs that may be incurred by utilities and other entities looking to deploy 900 MHz broadband systems as the largest SMR area-wide licensee could achieve its desired return on its 900 MHz spectrum investment more quickly[33]

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[32] Sandra Wendelken, Editor, *Pdv Wireless Needs $100 to $150 Million More Funding for 900 MHz Relocation*, Mission Critical Communications (June 4, 2019), available at: https://www.rrmediagroup.com/Features/FeaturesDetails/FID/926 (last visited Jul. 2, 2019).

[33] *Id.* (stating: "Earlier this year, O'Brien, said although the company's original plan of becoming a commercial broadband carrier focused on the critical infrastructure industries (CII) market still stands, the company plans to lease spectrum to investor-owned utilities (IOUs) that prefer private networks and can raise capital to deploy the technology. pdvWireless' target market is now IOUs because they have high credit ratings and strong balance sheets. The utilities serve a population of 220 million and generated

## CONCLUSIONS

The extensive record in this proceeding reveals the public interest supports the continued availability of ample 900 MHz narrowband frequencies in specific areas of the country for the foreseeable future, including the Refiners' Core Areas, and a strong interest in introducing broadband capabilities on 900 MHz band assignments. These objectives and the opportunity to minimize the time and expense in finalizing relocation negotiations can best be met by authorizing 1.4 x 1.4 MHz broadband assignments as outlined above. Rather than "pick winners and losers," the Commission should reasonably accommodate the interests of all parties having a strong interest in operating 900 MHz systems to meet their critical internal communications requirements.

**Respectfully submitted,**

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$260 billion in revenue in 2016. Offering 20-year leases is less capital intensive than becoming a CII carrier, O'Brien said").